

Comparison of Red Betel Leaf Decoction and Aloe Vera Decoction on Decreased Sugar Levels in Patients with Diabetes Mellitus at Setia Janji Health Center

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Abstract

Diabetes Mellitus is the third most common cause of death after cancer and cardiovascular disease in people aged 30-70 years (WHO 2016). The aim of the study was to compare the effect of red betel leaf decoction and aloe vera decoction on reducing blood sugar levels in people with diabetes mellitus at the Setia Janji Health Center. This research is a quantitative research. In this study the researchers used the Pre-Experiment research design with a One-Group Pretest-Posttest Design with a control approach. The research was carried out in February 2023 until it was completed at the Setia Janji Health Center. With a Sample of 40 People. Bivariate analysis using Bivariate Analysis was used to see how far the influence of each independent variable on the dependent variable used the Shapiro-Wilk data normality test and the Paired T-test paired samples.The study obtained that the average difference in blood sugar levels of DM patients before and after being given red betel leaf decoction was 82.90 mg/dL with a standard deviation of 28.069 mg/dL. The average difference in blood sugar levels of DM patients before and after being given red betel leaf decoction was 45.30 mg/dL with a standard deviation of 22.614 mg/dL. The results of the Mann Whitney statistical test obtained p = 0.000, where the p value ≤ 0.05, statistically it means that there is a difference in the average decrease in blood sugar levels given red betel leaf decoction (Piper crocatum) and aloe vera decoction. in people with diabetes mellitus at the Setia Janji Health Center. There is support from midwives in providing counseling about the benefits of decoction of red betel leaves and aloe vera as an alternative to herbal medicine in helping lower blood sugar levels in people with diabetes mellitus.

Keywords : Aloe Vera, Decrease in KGD, DM, Red Betel Leaf

INTRODUCTION

Diabetes mellitus (DM) or what is often known as "diabetes" is a metabolic disorder in which high levels of glucose in the blood are caused by the body's inability to produce insulin. A person is diagnosed with diabetes mellitus if fasting blood sugar > 100 mg/dl or 2 hours after eating > 140 mg/dl (American Diabetes Association, 2012). Diabetes mellitus is a chronic disease with a high number of cases in the world. According to the 2016 Global Report on Diabetes, it is estimated that globally, 422 million people worldwide suffer from diabetes in 2014 compared to 108 million people in 1980. It can be concluded that the prevalence of diabetes mellitus cases increases significantly every year (WHO, 2016; Wati, 2020). Lestari (2021) stated that Indonesia is a country that ranks fourth in terms of the number of people with diabetes after the United States, China and India. In addition, DM sufferers in Indonesia are expected to increase rapidly to 2-3 times in 2030 compared to 2000. Added to the explanation

of WHO (World Health Organization) data that, the world is now inhabited by 171 million DM sufferers (2000) and will increase by 2 times, 366 million in 2030. The Data and Information Center of the Indonesian Ministry of Health also stated that the latest estimate by the IDF (International Diabetes Federation) in 2035 is that there will be 592 million people living with diabetes in the world.

Data from the International Diabetes Federation (IDF) shows that 1 in 12 people in the world suffer from DM, and the average DM sufferer does not know that he has DM, sufferers only find out about their condition when the disease has been running for a long time with very obvious complications (Sartika, 2019).

According to data IDF (2019) there are 463 million adults (aged 20-79 years) who have DM in the world in 2019 and by 2045 the figure is expected to increase to 700 million (IDF, 2019; Setyawati *et al*., 2020). The incidence of DM in Indonesia increased from 2013 by 6.9% to 10.9% in 2018 (Kemenkes RI, 2018). In addition, the prevalence of DM in Bali Province has also increased to 1.7% in 2018 from 1.3% in 2013.

The percentage of Diabetes Mellitus in 2019 in North Sumatra was 249,519 sufferers and those who received health services were 144,521 sufferers or 57.92%. The remaining 104,998 did not go to health services (Afriani, 2019).

Referring to Basic Health Research, the incidence of diabetes in the province of North Sumatra in 2013 was still quite high, where the incidence of the population aged more than 15 years was 1.8%. The highest incidence rate of DM cases was in Deli Serdang province of 2.9%, the lowest rate was in Mandailing Natal district with an incidence rate of 0.3% for Asahan district itself with an incidence rate of 2.1% (Tarigan, 2021).

Treatment of diabetes mellitus can be done pharmacologically with the use of oral diabetes drugs and insulin. Long-term use of oral anti-diabetic drugs can cause side effects such as nausea, vomiting, diarrhea, headache, ataxia, vertigo, leukopenia and hypoglycemia. Therefore the use of herbal medicine is often an alternative choice. While in non-pharmacological terms are food planning, physical exercise, counseling (education), and complementary therapy, one of the complementary therapies is the use of herbal medicines that are able to treat diabetes mellitus such as red betel leaf (Swastini, 2018; Pasaribu, 2021).

The characteristic feature of this plant is its creeping, round purplish-green stems and no flowers, the leaves are stemmed like a heart shape with a tapered top, and the surface is shiny and hairless. The leaves can be 15-20 cm in size with a green upper part with a grayish-white pattern and a bright red underside. The leaves are slimy, taste bitter, and have a distinctive betel scent (Werdhany *et al*., 2018).

In Latin, red betel leaf is known as Piper crocatum which belongs to the Familia piperaceae. Chemical compounds contained in these leaves include flavonoids, alkaloids, amino acids and so on. The content of flavonoids contained in red betel leaves can regenerate Langerhans islet cells so that they can increase the production of the hormone insulin in experimental rats with diabetes mellitus (Lestari et al., 2021).

According to Lestari (2021) many herbal ingredients are reported to contain flavonoids which are antioxidants, one of which is red betel leaf (Piper crocatum), red betel can be used as medicine by consuming the leaves or extracting them first. Antioxidant compounds contained in red betel leaf extract are able to neutralize excess free radical compounds in pancreatic ß cells by donating electrons or breaking chain reactions and causing free radicals to stabilize. The antioxidant content of red betel leaves (Piper croacatum) has been widely proven to reduce blood sugar levels, but there is no certainty of the right concentration of red betel leaves to reduce blood sugar levels.

Based on research data Afriani (2019) that the level of sufferers of Diabetes Mellitus from year to year is increasing while there is no control for the use of organic materials used in reducing DM, while the availability of organic materials in controlling DM is very much available in the yard of the house including red betel leaves and aloe vera (Afriani, 2019; IDF, 2019; Kemenkes RI, 2018).

Based on the background above, the researcher is interested in taking the research title "Comparison of Red Betel Leaf Decoction and Aloe Vera Decoction on Decreased Blood Sugar Levels in Diabetes Miletus Patients at Setia Janji Health Center".

METHODS

The research design is the research design that will be carried out. This research is a quantitative research. In this study the researchers used the Pre Experiment research design with the One-Group Pretest-Posttest Design with control approach which aims to test the hypothesis through an intervention in one sample group and does not have a control group (Sugiyono, 2018). This method is used to determine the comparative effect of red betel leaf decoction with aloe vera decoction to reduce blood sugar levels in people with diabetes mellitus.

The population in this study was 500 populations, with a total sample of 40 respondents, the samples were female mothers of childbearing age 29-49 years. The research was conducted in February 2023 at the Setia Janji Health Center. Sampling in this study using accidental sampling technique. In the research method of data collection, questionnaires will be given

after Ethicel clearance is released, so research is carried out in the form of a pre-test before being given treatment. Furthermore, the intervention and control groups were each given different treatment according to the existing SOP, but both were given treatment and assessed for its effectiveness in reducing blood sugar levels in people with diabetes mellitus. The treatment that has been given is then assessed to observe the results of the treatment that has been carried out using a post test with a one-group pretest-posttest design analysis.

RESULTS

1. Univariate analysis

The characteristics of respondents with diabetes mellitus at the Setia Janji Health Center in this study were grouped by age. Respondent characteristics can be seen in table 1 below:

Table 1. Characteristics of Diabetes Mellitus Patients Based on Age at Setia Janji Health Center.

No	Age	Red Betel Leaf Group		Aloe Vera Group	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1	30-39 Year	7	35,0	8	40,0
2	40-50 Year	13	65,0	12	60,0
	Amount	**20**	**100,0**	**20**	

Respondent characteristics based on demographic data based on age in the red betel leaf group were mostly 13 people (65.0%) aged 40-50 years, while 7 people (35.0%) were 30-39 years old. The age characteristics of the aloe vera group were mostly 12 people (60.0%) aged 40-50 years, and 8 people (40.0%) aged 30-39 years. Average Blood Sugar Levels Before and After Giving Red Betel Leaf (Piper Crocatum) Decoction in Patients with Diabetes Mellitus.

Data on average blood sugar levels before and after being given red betel leaf (Piper Crocatum) decoction to people with diabetes mellitus at the Setia Janji Health Center can be seen in Table 2 below:

Table 2. Average Blood Sugar Levels Before and After Giving Red Betel Leaf Decoction (Piper Crocatum) to Patients with Diabetes Mellitus at Setia Janji Health Center.

Blood Sugar Levels	N	Mean	Std. Deviasi	Min-Max	Tall	Low
Before	20	266,05	48,203	205 – 411	20 (100%)	0 (0,0%)
After	20	183,15	32,217	140 – 260	4 (20%)	16 (80%)

Based on the table above, it was obtained that the average blood sugar level before being given red betel leaf (Piper crocatum) decoction was 266.05 mg/dL with a standard deviation of 48.203 mg/dL. The lowest blood sugar level was 205 mg/dL and the highest was 411 mg/dL

at Setia Janji Health Center. The overall percentage of DM sufferers who have high sugar levels (> 200 mg/dL) is as many as 20 people (100%).

After being given red betel leaf decoction for 7 days with a period of administration in the morning and afternoon, there was a decrease in blood sugar levels in diabetes mellitus patients with an average decrease of 183.15 mg/dL with a standard deviation of 32.217 mg/dL. The lowest sugar content is 140 mg/dL and the highest is 260 mg/dL. The percentage of patients who had high sugar levels (> 200 mg/dL) decreased to 4 people (20%), while DM sufferers who had low sugar levels (<200 mg/dL) were 16 people (80%).

Data on average blood sugar levels before and after being given aloe vera decoction to people with diabetes mellitus at the Setia Janji Health Center can be seen in table 3 below :

Table 3. Average Blood Sugar Levels Before and After Giving Aloe Vera Decoction to Patients with Diabetes Mellitus at Setia Janji Health Center.

Blood Sugar Levels	N	Mean	Std. Deviasi	Min-Max	Tall	Low
Before	20	259,20	37,084	205 – 318	20 (100%)	0 (0,0%)
After	20	213,90	43,978	140 – 290	8 (40%)	12 (60%)

Based on Table 3, the average blood sugar level before being given aloe vera decoction was 259.20 mg/dL with a standard deviation of 37.084 mg/dL. The lowest blood sugar level was 205 mg/dL and the highest was 318 mg/dL at the Setia Janji Health Center. The overall percentage of DM sufferers who have high sugar levels (> 200 mg/dL) is as many as 20 people (100%).

After being given red betel leaf decoction for 7 days with a period of morning and afternoon administration, there was a decrease in blood sugar levels in diabetes mellitus patients with an average decrease of 213.90 mg/dL with a standard deviation of 43.978 mg/dL. The lowest sugar content is 140 mg/dL and the highest is 290 mg/dL. The percentage of patients who had high sugar levels (> 200 mg/dL) decreased to 8 people (40%), while DM patients who had low sugar levels (<200 mg/dL) were 12 people (60%).

2. Normality Test Results

The normality test is used to determine whether the sample taken comes from a normally distributed population. The normality test used is the normality test with the Shapiro-Wilk method. The results of the normality test data processing can be seen in Table 4 below:

Table 4. Pretest – Posttest Normality Test Results for the Red Betel Leaf Group and the Aloe Vera Group.

Data	Sig.	Condition	Information
Red Betel Leaf Group			
KGD Before	0,028	p > 0,05	Abnormal
KGD After	0,090		Normal
Aloe Vera Group			
KGD Before	0,191	p > 0,05	Normal
KGD After	0,009		Abnormal

The results of the normality test analysis using the Shapiro-Wilk obtained pre-test data in the red betel leaf group were not normally distributed where the p value was 0.028 <0.05. Meanwhile, the post-test data for the red betel leaf group were normally distributed, where the p value was 0.090 > 0.05. While the pre-test data in the aloe vera group were normally distributed where the p value was 0.191> 0.05. Meanwhile, the post-test data in the aloe vera group were not normally distributed, where the p value was 0.009 <0.05. Therefore bivariate analysis was carried out using a non-parametric test, namely the Wilcoxon test.

3. Bivariate Analysis

Bivariate analysis aims to determine the ratio of red betel leaf decoction and aloe vera decoction to decrease blood sugar levels in diabetes mellitus patients at Setia Janji Health Center.

Table 5. Differences in Blood Sugar Levels Before and After Giving Red Betel Leaf Decoction to Patients with Diabetes Mellitus at Setia Janji Health Center.

Data	Mean	Std. Deviasi	Different		p-value
			Mean	Std. dev	
KGD Before	266,05	48,203	82,90	28,069	0,000
KGD After	183,15	32,217			

Based on Table 5, it was found that the average difference in blood sugar levels of DM patients before and after being given red betel leaf decoction was 82.90 mg/dL with a standard deviation of 28.069 mg/dL. The results of the Wilcoxon test statistical test obtained a p value = 0.000, where the p value ≤ 0.05, statistically it means that there is an effect of giving red betel leaf decoction on a decrease in blood sugar levels in diabetes mellitus patients at the Setia Janji Health Center.

Table 6. Differences in blood sugar levels before and after being given aloe vera decoction to patients with diabetes mellitus at the Setia Janji Health Center

Data	Mean	Std. Deviasi	Different		p-value
			Mean	Std. dev	
KGD Before	259,20	37,084	45,30	22,614	0,000
KGD After	213,90	43,978			

Based on Table 6, it was found that the average difference in blood sugar levels of DM patients before and after being given aloe vera decoction was 45.30 mg/dL with a standard deviation of 22.614 mg/dL. The results of statistical tests using the Wilcoxon test obtained a p value = 0.000, where the p value ≤ 0.05, statistically it means that there is an effect of giving aloe vera decoction to reducing blood sugar levels in people with diabetes mellitus at the Setia Janji Health Center.

Table 7. Comparison of the Difference in Lowering Blood Sugar Levels Given Red Betel Leaf Decoction and Aloe Vera Decoction in Patients with Diabetes Mellitus at Setia Janji Health Center

Data	Mean	Std. Deviasi	p-value
Difference (*Pre-Post)* KGD Red Betel Leaf Decoction	82,90	28,069	0,000
Difference (*Pre-Post)* KGD Aloe Vera Decoction	45,30	22,614	

Based on Table 7, it was found that the average difference in blood sugar levels of DM patients before and after being given red betel leaf decoction was 82.90 mg/dL with a standard deviation of 28.069 mg/dL. The average difference in blood sugar levels of DM patients before and after being given red betel leaf decoction was 45.30 mg/dL with a standard deviation of 22.614 mg/dL. The results of the Mann Whitney statistical test obtained a p value = 0.000, where the p value ≤ 0.05, statistically it means that there is a difference in the average decrease in blood sugar levels given red betel leaf decoction (piper crocatum) and aloe vera decoction in people with diabetes mellitus at the Setia Janji Health Center. When viewed from the average blood sugar levels in the two treatments, it was found that giving red betel leaf decoction was more effective in lowering blood sugar levels in DM sufferers compared to giving aloe vera decoction.

DISCUSSION

Effect of Red Betel Leaf Decoction After Giving Blood Sugar Levels in Diabetic Miletus Patients at Setia Janji Health Center.

Based on the results of the study, before being given red betel leaf decoction, the blood sugar levels of DM patients varied between 200-411 mg/dL. According to the researchers' assumptions, diabetes mellitus is caused by an unhealthy diet which is characterized by an increase in blood glucose, namely > 200 mg/dl and reaching 411 mg/dL, this shows that the results of the initial blood sugar measurement or pre-test are proven to have diabetes mellitus and after analysis the initial blood glucose level averaged 266.05 mg/dl. Various causes of

increased blood sugar levels in patients are caused by an unhealthy lifestyle, irregular eating patterns, activity and work patterns, accompanied by genetic diseases in the family.

Based on research, after being given red betel leaf (Piper crocatum) decoction for 7 days with a period of morning and afternoon administration, an average blood sugar level of 183.15 mg/dL was obtained with a standard deviation of 32.217 mg/dL. The lowest blood sugar level was 140 mg/dL and the highest was 260 mg/dL in the working area of the Setia Janji Health Center.

The results of blood sugar levels in people with diabetes mellitus before being given red betel leaf therapy at the Setia Janji Health Center showed an average blood sugar level of 266.05 mg/dl. While blood sugar levels in people with diabetes mellitus after being given red betel leaf therapy obtained an average blood sugar level of 183.15 mg/dl. The range of blood sugar levels in diabetes mellitus patients before and after being given red betel leaf therapy for 7 consecutive days was from 266.05 mg/dL (pre test) to 183.15 mg/dL (post test) or there was a decrease in blood sugar levels of 82.9 mg/dL or around 31.1%. The results of the Independent T-test statistic test obtained a value of $p = 0.000$, which means that there is an effect of giving boiled red betel leaves (Piper crocatum) on a decrease in blood sugar levels in people with diabetes mellitus at the Setia Janji Health Center.

The results of this study are in line with (Widiyono & Suwarni, 2019) regarding Red Betel Leaf Decoction Has an Effect on Reducing Blood Glucose in Patients with Type II Diabetes Mellitus states that there is an effect of giving red betel leaf decoction in reducing blood glucose in type II diabetes mellitus sufferers in Batupuro Sampang Village, Madura. The results of this study are also in line with research (Listiana *et al*., 2019) about the effectiveness of red betel leaf boiled water to reduce blood sugar levels in diabetes mellitus patients in the Working Area of the Saling Health Center which stated that there were differences in GDS (during blood sugar) levels of Diabetes Mellitus patients before and after administration of red betel leaf boiled water. In conclusion, red betel leaf boiled water is significantly effective in reducing blood sugar levels in patients with diabetes mellitus.

Red betel leaves contain tannins in which there are flavonoids and alkaloids which are active compounds that have hypoglycemic activity, these compounds can help regenerate pancreatic cells in producing insulin. Consuming red betel leaf decoction has an effect on changes in blood sugar levels in patients with Diabetes Mellitus. This is caused by flavonoids and alkaloids which act as a lowering of blood sugar levels. In addition, many alkaloid compounds in red betel leaves can increase the activity of the glucose oxidase enzyme so that more glucose is absorbed by the body's cells. Flavonoids can regenerate damage to pancreatic

beta cells, flavonoids are antioxidants that can remove, clean, restrain the formation or eliminate the effects of free radicals. Flavonoids work by inhibiting damage to the islets of Langerhans cells in the pancreas and regenerate cells so that they produce insulin again. (Widiastuti *et al*., 2022).

Red betel leaves contain tannins in which there are flavonoids and alkaloids which are active compounds that have hypoglycemic activity, these compounds can help regenerate pancreatic cells in producing insulin. Consuming red betel leaf decoction has an effect on changes in blood sugar levels in patients with Diabetes Mellitus. This is caused by flavonoids and alkaloids which act as a lowering of blood sugar levels. Giving red betel leaf decoction affects all components that make limitations for patients such as being able to lower blood glucose levels in people with Diabetes Mellitus, helping to stabilize insulin deficiency (Sari & Karunia, 2020).

According to research results (Listiana *et al*., 2019) it was found that most of the respondents with Diabetes Mellitus did not know the benefits or uses of red betel leaves. Red betel leaf is an alternative treatment that is better, natural, cheap, easy to get, with minimal effect on lowering blood sugar levels. The results obtained for blood glucose levels in people with diabetes mellitus proved to have decreased after being given red betel leaf therapy, namely from 209.30 mg/dl (pre test) to 186.30 mg/dl (post test).

This is in accordance with the theory according to Saputra (2018) in (Sari & Karunia, 2020). One of the efforts that can be made to lower blood sugar levels in DM sufferers is to give red betel leaf decoction. Red betel leaf (Piper crocatum) contains phytochemical compounds including flavonoid compounds. The results of this study are the same as those conducted by (Mentari *et al*., 2019) about the effect of red betel leaf decoction therapy on reducing blood glucose levels in people with Diabetes Mellitus in Candirejo Village, Ungaran Barat District, where the average blood sugar level before being given boiled water of red betel leaves in DM sufferers was 322.80 mg/dl.

The decrease in blood sugar levels after being given red betel leaf decoction can be explained through two main mechanisms, namely intra-pancreatic and extra-pancreatic. The intra-pancreatic mechanism works by repairing damaged pancreatic β cells and protecting β cells from damage and stimulating insulin release. This ability is owned by alkaloids and flavonoids. Alkaloids are proven to have the ability to regenerate damaged pancreatic β cells. Increased insulin secretion is caused by a sympathetic nerve stimulatory effect from alkaloids which has an effect on increasing insulin secretion. Flavonoids have an antioxidant effect so

that they can protect pancreatic cell damage from free radicals. Extra pancreatic mechanisms can take place through various mechanisms (Angraini *et al*., 2020)

The Effect of After Being Given a Decoction of Aloe Vera Leaves on Reducing Blood Sugar Levels in Diabetic Miletus Patients at the Setia promised Health Center.

ased on the table above, the average blood sugar level before being given aloe vera leaf decoction was 259.20 mg/dL with a standard deviation of 37.084 mg/dL. The lowest blood sugar level was 205 mg/dL and the highest was 318 mg/dL at Setia Janji Health Center.

Based on research after being given a decoction of aloe vera leaves for 7 days with a period of morning and afternoon administration, an average blood sugar level of 213.90 mg/dL was obtained with a standard deviation of 43.978 mg/dL. The lowest blood sugar level is 140 mg/dL and the highest is 290 mg/dL.

The results of the bivariate analysis can be seen that the average frequency of blood glucose levels in DM sufferers before being given aloe vera decoction was 259.20 while after being given aloe vera decoction was 213.90. It can be concluded that there was a decrease in blood glucose levels after being given aloe vera decoction for 7 days with periods of administration in the morning and afternoon. Aloe vera (Aloe vera L.) the white gel part of aloe vera can help lower blood sugar levels in the body (Batubara & Prastya, 2020).

In this study using the Wilcoxon test, it was found that there was a difference in the average frequency of blood glucose levels before and after being given aloe vera decoction. From the analysis it was also obtained that the p value <α, namely 0.000 <0.05, in other words the hypothesis (Ha) was accepted and the hypothesis (Ho) was rejected, so it was concluded that there was a difference in blood glucose levels before and after being given aloe vera decoction.

Research result (Qahar, 2020) states that aloe vera has chemical compounds that have hypoglycemic properties including chromium, alprogen, acemannan, anthraquinone, phytosterol, and methanol which are proven to reduce blood glucose levels in type 2 diabetes mellitus.

The results of this study are in line with research (Ariska, 2019) conducting research for 7 consecutive days with treatment in the form of giving aloe vera decoction. Prior to the intervention, all blood sugar was measured first, then measured again on day 7. The results showed that the average blood sugar level score before the intervention was 178.73 and after the intervention was 172.18 with an average decrease of 2.258. . The statistical test results

stated that there were differences in blood sugar levels before and after the intervention of giving aloe vera boiled water, with a P value (0.016) < (0.05).

The results of this study are also supported by research (Aryani *et al*., 2021) it was concluded that there was a significant effect of aloe vera decoction on decreasing blood sugar levels in type 2 DM patients at the Kebun Lada Health Center, North Binjai District, significantly with a Z value = 3.183 and a p value = 0.001 (p <0.05). It is recommended for type 2 DM patients to continue consuming aloe vera decoction and routine control to check blood sugar levels to keep them stable.

According to the theory, the content of aloe emodin from aloe vera (aloe vera) activates insulin signaling levels such as insulin absorbent β and phosphatidyl inositol-3 kinase, substrate-1, and increases the rate of glycogen synthesis, inhibits glycogen synthesis kinase-3 β, 1 so that it is useful for reducing glycogen synthesis. blood sugar ratio In addition to aloe emodin, aloe vera also contains chromium which has the same function as insulin, which helps make it easier for glucose to enter cells and this can be used to lower a person's blood sugar levels (Ariska, 2019).

In addition to aloe vera (Aloe vera) contains quite a lot of nutrients and is very beneficial for the body, including chromium. Chromium is said to stabilize blood sugar levels. Chromium is needed by the body for the metabolism of carbohydrates and fats. Chromium together with insulin, serves to facilitate the entry of glucose into the body (Silalahi, 2021). Chromium regulates the function of the insulin hormone to more efficiently distribute glucose into the bloodstream into cells. Increase the number of insulin receptors on the cell membrane and facilitate the binding of insulin to cells (Arisman, 2008) *in* (Ariska, 2019).

Based on the results of the analysis between the facts and the above theory, the researcher agrees that giving aloe vera decoction can lower a person's blood sugar levels because of the content contained in the aloe vera itself. When someone consumes aloe vera boiled water, chromium will help insulin to enter blood sugar that has accumulated in the blood vessels so that it can enter the cells so that the body's metabolic processes are fulfilled and can be detected by measuring fasting blood sugar. The chromium content in aloe vera is believed to reduce blood sugar levels in diabetes mellitus patients.

According to the assumptions of researchers based on the results of this study that giving aloe vera decoction can reduce blood glucose levels because of the content contained in aloe vera itself. When someone consumes aloe vera decoction, chromium will help insulin to enter blood sugar that has accumulated in the blood vessels so that it can enter the cells so that the body's metabolic processes are fulfilled and can be detected by measuring fasting blood sugar.

Blood glucose levels cannot fall directly because diabetes mellitus is a chronic disease that cannot be cured permanently, it's just that it can be overcome by giving therapy, one of which is using aloe vera decoction (Listiana et al., 2019)

The content of chromium is useful in stimulating pancreatic beta cells in releasing the hormone insulin into the blood. Chromium can help the work of the insulin hormone by helping receptor cells bind to insulin. Chromium can increase serotonin which functions to increase glucose use by muscles, and has an effect on insulin secretion. Another benefit of chromium is to improve insulin resistance by binding to insulin receptors, then chromium will increase the activity of tyrosine kinase, IRS-1 (*Insulin Receptor Substrate*-1). This condition will increase GLUT 4 activity in binding glucose to be used as energy (Arif & Solikhah, 2023).

Comparison of Red Betel Leaf Decoction and Aloe Vera Decoction on Decreased Blood Sugar Levels in Diabetic Miletus Patients at the Setia promised Health Center.

Based on the table above, the average difference in blood sugar levels of DM patients before and after being given red betel leaf (*Piper crocatum*) decoction was 82.90 mg/dL with a standard deviation of 28.069 mg/dL and in the group given aloe vera decoction (*Aloe vera*) was 45.30 mg/dL with a standard deviation of 22.614 mg/dL. The results of the Mann Whitney Independent statistical test obtained p value = 0.000, where the p value ≤ 0.05, statistically it means that there is a difference in the effect of giving boiled red betel leaves (*Piper crocatum*) and boiled aloe vera (*Aloe vera*) on decreasing blood sugar levels in people with diabetes mellitus at the Faith Health Center..

Based on the results of the average difference in blood sugar levels of DM sufferers who were given red betel leaf decoction (*Piper crocatum*) and aloe vera decoction (*Aloe vera*) it can be seen that the decrease in blood sugar levels in DM sufferers who were given red betel leaf decoction (*Piper crocatum*) was more higher compared to the decrease in blood sugar levels of DM patients who were given aloe vera decoction with a difference of 82.90 - 45.30, which is equal to 37.60 mg/dL. These results prove that the effectiveness of giving red betel leaf decoction (*Piper crocatum*) is more effective in reducing blood sugar levels in DM sufferers at the Setia Janji Health Center for 7 days with a period of morning and afternoon administration.

Red betel leaf decoction has potential as an anti-diabetic. Medicinal plants that function as anti-diabetic have several working mechanisms. One of them is through the working mechanism of the glucose oxidase enzyme. The enzyme glucose oxidase is an enzyme that

functions to catalyze the oxidation of β-D-glucose to gluconic acid by using molecular oxygen as an electron acceptor (Agustanti, 2008) in (Harmawati, 2018).

Blood glucose levels in people with diabetes mellitus have been shown to decrease after being given red betel leaf decoction, from 266.05 mg/dL (pre test) to 183.15 mg/dL (post test). According to the researchers, it was found that most of the respondents with Diabetes Mellitus had proven the benefits or uses of red betel leaves. Red betel leaf is an alternative treatment that is better, natural, cheap, easy to get, with minimal effect on lowering blood sugar levels. Where red betel leaves contain tannins, alkaloids and polyphenols which have antidiabetic activity or lower blood sugar levels.

Likewise, the effectiveness of aloe vera decoction in reducing blood sugar levels has also proven effective. Where the results show that blood glucose levels in people with diabetes mellitus have proven to decrease after being given aloe vera decoction, namely from 259.20 mg/dL (pre test) to 213.90 mg/dL (post test) with a decrease of 45.3 mg/dL or 17.4%. These results also prove that aloe vera decoction is also proven to be effective in reducing blood sugar levels in DM sufferers.

In relation to obedience, behavior plays a very important role. One of the behavioral theories that is widely used in the case of DM patients is the Health Belief Model (HBM) (Karimi et al., 2018). This theory measures the perception felt by sufferers for a healthy lifestyle. Internal factors themselves are an important key when deciding to take an action. Therefore, patients must believe that the benefits of healthy behavior are important for them to be healthy.

CONCLUSIONS

There is an effect of giving red betel leaf decoction to decreasing blood sugar levels in diabetes mellitus patients at Setia Janji Health Center with a value of $p = 0.000$ ($p <0.05$). There was an average decrease in blood sugar levels of DM patients before and after being given red betel leaf decoction of 82.90 mg/dL. This proves that giving red betel leaf decoction is effective in reducing blood sugar levels in people with diabetes mellitus.

The effect of giving aloe vera decoction to reducing blood sugar levels in diabetes mellitus patients at the Setia Janji Health Center, with a value of $p = 0.000$ ($p <0.05$). There was an average decrease in blood sugar levels of DM patients before and after being given aloe vera decoction of 45.30 mg/dL. This proves that giving aloe vera decoction is effective in reducing blood sugar levels in people with diabetes mellitus.

There is a comparison of the average reduction in blood sugar levels given red betel leaf decoction and aloe vera decoction to people with diabetes mellitus at the Setia Janji Health Center, with a value of p = 0.000 (p <0.05). When viewed from the average blood sugar levels in the two treatments, it was found that giving red betel leaf decoction was more effective in lowering blood sugar levels in DM sufferers compared to giving aloe vera decoction.

SUGGESTION

Based on the results of this study, the researchers provided suggestions including, the existence of support from midwives in providing counseling and counseling about the benefits of red betel leaf decoction and aloe vera decoction as an alternative to herbal medicine in helping to lower blood sugar levels in people with diabetes mellitus, the support of educational institutions can be other things as an addition to the literature as an additional library material and used as a reference and information for readers whose results can add insight into knowledge about the effectiveness of giving red betel leaf decoction and aloe vera decoction to reduce blood sugar levels in people with DM.

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